

Cyber-soldiers may save lives

San Diego lab developing robots for battlefield use

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In a way, H.R. “Bart” Everett is looking for a few good robots.

Since the Iraq war began in March 2003, the Pentagon has counted 2,376 fatalities among U.S. troops, with nearly one-third, or 767 deaths, caused by booby traps known as IEDs, or improvised explosive devices.

Now, recent advances in robotics offer a way to use machines to assume some of the deadliest jobs on the battlefield.

“Basically, the robot is our answer to the suicide bomber,” said Everett, technical director for robotics at the Navy's robotics lab in San Diego. Everett also views the robot as the answer to disarming Iraqi booby traps, providing base security, monitoring weapons depots and other tasks.

The military's demand for such technology has been practically insatiable. Everett said that in 2004, U.S. military forces in Afghanistan and Iraq were operating a total of 163 robots known as UGVs, or unmanned ground vehicles. By the end of this year, that number is expected to reach 4,000, according to Pentagon estimates.



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ATRV, an all-terrain robotic vehicle about the size of a lawnmower, rolled into a Navy robotics laboratory in a demonstration of its ability to operate without continual human guidance.

Many of those robots are remotely operated vehicles with mechanical arms that can be used to disarm the deadly IEDs. Such robots cost about \$140,000 each, Everett said.

But he added that military field commanders are growing increasingly concerned about the vulnerability of the teams that operate the robots. Some technicians become so engrossed in working the joystick that remotely controls their robot that they lose awareness of their own surroundings, making them vulnerable to possible attack.

As a result, the Navy's robotics lab in Point Loma has focused in recent months on developing new capabilities so robots can operate more autonomously.

The lab, part of the Space and Naval Warfare Systems Center, has been participating in the Pentagon's Joint Robotics Program, which oversees the development and deployment of such machines.

The facility itself reflects a recent surge in Pentagon support for robotics. Everett said when he arrived at the lab in 1986, “we had one little building with eight people.” Today the facility, with a spectacular view of the Pacific Ocean, employs more than 70 people in eight buildings, with two more under construction.

Recent advances in autonomous technology have been so rapid that Everett predicts U.S. soldiers eventually will work with robots in the same way a hunter works with a bird dog.

“Troops of the future are going to be equipped with a lot of electronics imbedded in their uniforms and their weapons,” he said. Ideally, such technology will allow a robot to follow a soldier's commands, such as, “Go through the door in front of you.”

To do that, however, a robot needs to be smart enough to know what a door is and how to find it, Everett says. A robot that can navigate on its own, or perhaps

follow a soldier on patrol, represents a breakthrough in technology.

In recent months, Everett's team has come close to accomplishing that with an all-terrain robotic vehicle, or ATRV, about the size of a lawn mower. In one field demonstration, the ATRV entered a World War II-era bunker in Point Loma, explored the interior without human guidance and generated a rough map that depicts the interior rooms and hallways.

Initial funding of \$50,000 for the accelerated research and development was provided March 31 by a San Diego-based consortium of military, industry and academia known as CCAT, the Center for Commercialization of Advanced Technology.

While the amount is modest, Everett said he's using the grant to buy parts and supplies that enable him to make better use of summer interns and other temporary engineering professionals working at the lab.

The center plans to spur further efforts this summer by offering more than \$300,000 in total grants to develop new autonomous robot technologies, CCAT director Barry Janov said. The center plans to issue a solicitation for proposals next month and award grants in July or August.

In addition to developing new technology, Everett's robotics lab has been working with such robot makers as iRobot and Foster-Miller, both based in the suburban Boston area.

Increased Pentagon spending also has drawn interest from a large number of companies, said Darren Corbieri, a defense industry analyst with Frost & Sullivan



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A robotic vehicle operated as a sentry, providing security for a military base.

in San Antonio. Major defense contractors, including Alliant Technologies, Honeywell, Boeing, Teledyne and Lockheed Martin, are “all attempting to integrate robotics into the battlefield,” Corbieri said.

He added that using autonomous robots to create maps is key to a relatively new Pentagon concept for operating robots in “swarms.”

The concept calls for fielding a group of robots that would operate together, Corbieri said.

“A single robot on the battlefield becomes the control robot for the swarm, with other robots around it,” he said. The group would share information, with different robots designed to perform roles that range from surveillance to firing weapons.

“We have made a tremendous amount of progress just in the last two years,” Everett said. “Even six months ago, we couldn't have done all that we showed” in the recent field tests.

He hopes to ship a robot incorporating the ATRV's technology to Iraq by the end of the year to fulfill an urgent request from the Army for a robot that can map the bunkers built by Saddam Hussein. To Everett, it's just one more way that robots can be used to save the lives of U.S. soldiers.